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Oleomargarine

OR

BOGUS BUTTER:

ITS COMPOSITION,

IMPURITIES,

DANGERS,

AND OBJECTIONS TO ITS USE;

METHODS OF DETECTING IT, &c.

ILLUSTRATED.

BY

REV. EDWARD HUBER,

(MICROSCOPIST).

Reprinted from "SOUTHERN CLINIC."

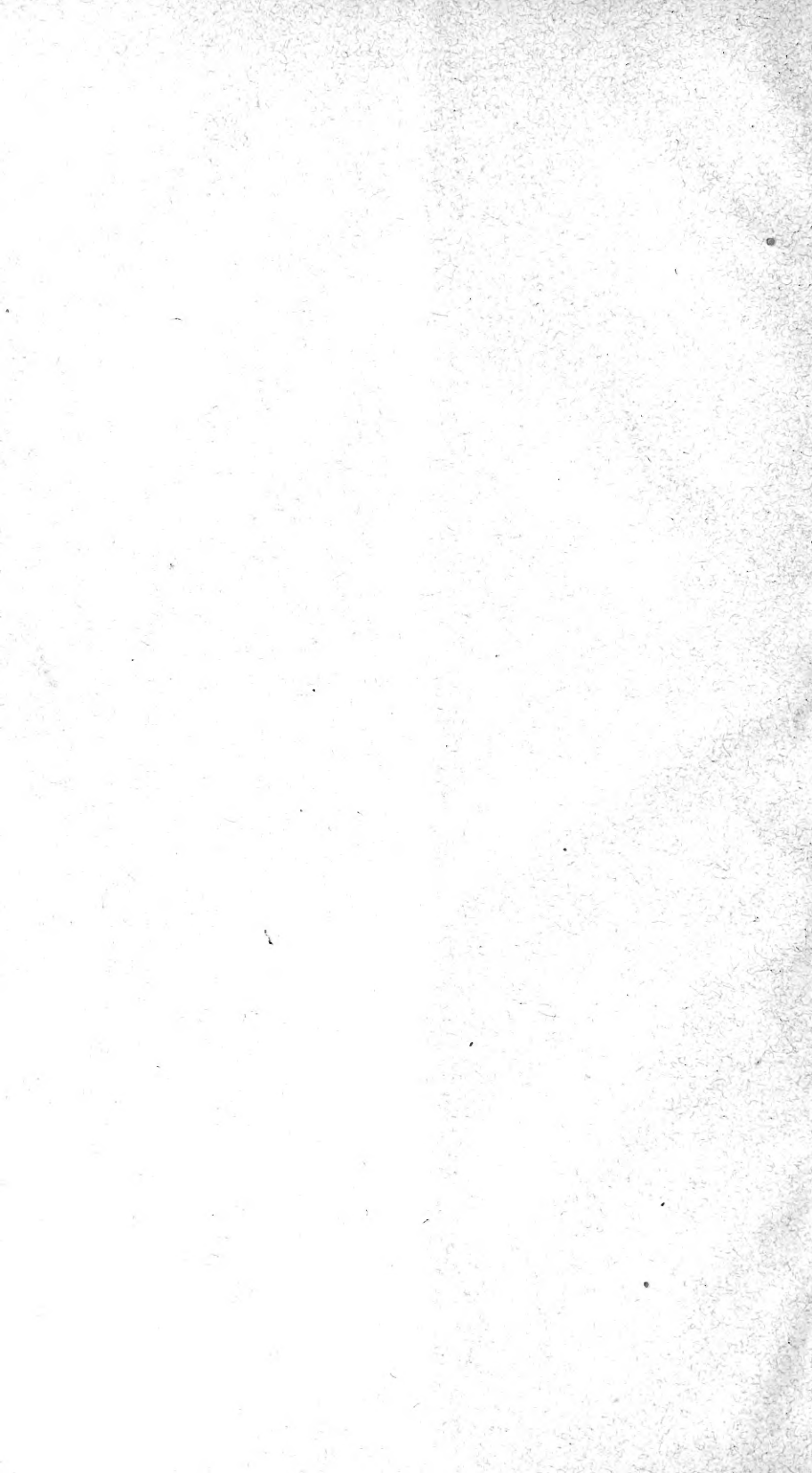
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RICHMOND:

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1880.



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OLEOMARGARINE

VS.

BUTTER.

THE question of oleomargine has lately agitated the public mind to a considerable extent. The friends and manufacturers of this artificial butter extol its merits to the clouds as being the greatest discovery and blessing of the century. One enthusiastic oleomargarine friend of mine even modestly compares its importance and its wonderful triumphs, in the face of so much opposition and persecution, to the blessings and triumphs of the Christian religion. On the other hand, dairymen denounce it as the worst imposition which could have afflicted the patient and long suffering consumers,—and these certainly have suffered not a little from bad butter, especially in our large cities. As I would not trust such conflicting and contradictory statements, I called to my assistance an old and trusted friend, who had already given me true and reliable information in a great many instances when other means utterly failed—the microscope.

The microscopical examination of butter and oleomargarine is very easy and simple. A very small quantity of either is put on a glass slide, covered with a thin microscopical glass cover, and then pressed to a thin film. An amplification of 150 to 200 diameters will sufficiently show the leading characteristics of the two articles. My examina-

tions were made on an old German Plössl stand, with a half-inch objective, and on a "Zentmayer's grand American stand," with a Tolles' quarter-inch objective. During the last two years I have examined several hundred samples of oleomargarine and butter. While writing this paper, upon the suggestion of the Editor I examined fifty additional samples of butter, in order to find out how much oleomargarine was sold as butter.

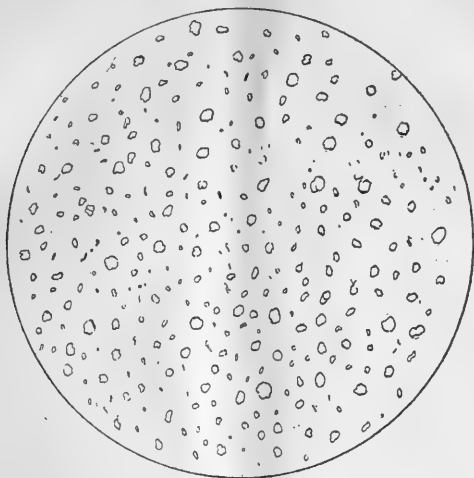
The difference between natural and artificial butter under the microscope is a most marked one, as every one can see who



Oleomargarine magnified about 200 diameters.

will look at the two accompanying wood cuts. Oleomargarine shows over the whole field feathery and stellate crystals which are never seen in genuine butter. I did not find one single sample of oleomargarine free from them. While not every field of the same preparation showed as many as our illustration, and some few fields were nearly free from them, others showed a great many more, besides a number of suspicious looking things: shreds of tissue, muscular fibre, etc., giving a rather irregular appearance to the whole, while the appearance of natural butter is very regular, showing of foreign substances only the cubical crystals of common salt. In oleomargarine, the essential oil globules are of much less frequent occurrence than in butter, which consists almost entirely of them.

These feathery and stellate masses are margarine-crystals. They are formed by the separation of solid fat from the natural fatty masses of the body in the cooling of the latter after death. Some very high authorities look upon these crystals as the incipient stage of decomposition, while their continual presence in oleomargarine, and their total absence in butter, show conclusively that there is an important



Natural butter magnified about 200 diameters.

difference between the two articles, and that the fat of natural butter is a different thing from that of oleomargarine.

This is also corroborated by the practical experience of our house-keepers, who find oleomargarine entirely unsuited for cooking purposes.

I entertain no prejudice whatever against this new article of food, but would be very glad to find it what its manufacturers and friends claim it to be—a real substitute for butter—equal and indeed superior to the latter in every essential point. But upon examination I find that the claims and assertions of these men are very unreliable, and some of their statements evidently calculated to mislead the public in regard to the facts of this matter; and the brilliant array of scientific men whom they bring out as witnesses in their favor, does not alter my opinion in the least. For the sake of brevity I shall only notice two of these witnesses, from a great number which I might mention, and which are all similar. Before me lies the circular of the Commercial

Manufacturing Company of New York, full of recommendations of oleomargarine by eminent men. A prominent place is given to the statement of a microscopist, headed: "Oleomargarine Microscopically compared with Milk-Butter, by Prof. J. W. S. Arnold, of the University of New York, the highest authority in this country." There are five illustrations by Prof. Arnold of the appearance of the two articles under the microscope. They are described as follows:

"Figure one represents caulfat under the microscope, the crystalline nature and adipose tissue being clearly seen, also a globule of oil."

"Figure 2 represents oleomargarine before it is churned, or what is known as oleomargarine oil. It will be seen from this plate that oleomargarine before being churned is entirely in a crystalline condition."

"Figure 3 represents natural butter first-melted, and then allowed to cool slowly to a solid condition. The microscope shows the same crystallization as in oleomargarine oil, (figure 2,) from which it in no way differs."

"Figure 4 represents oleomargarine butter, and figure 5 natural butter. It will be seen by examination of these two figures that they consist of an innumerable number of minute globules of varying size, and are identical in appearance and all other respects."

Now in none of these plates is the least trace of margarine crystals which form such a marked characteristic of every sample of oleomargarine which I have examined. Figures 4 and 5 are tolerably good representations of butter, *but not of oleomargarine*. In regard to figure 3 I have to say, that I have taken common lard, melted it, and while it slowly cooled to a solid condition its appearance was exactly that of figure 3 of Prof. Arnold's plates. On the next page of this circular are two further illustrations. Figure 6 shows the oleomargarine crystals in great number, and looks in every respect like our wood cut. It is a true representation of oleomargarine as it is sold in our markets, while figure 7 is nothing but a fancy sketch and gross exaggeration. Now the circular says, in regard to these two figures:

"Our enemies, unable to obtain a reliable scientific condemnation of olemargarine, resorted to an unknown amateur, who represents the product under the microscope as shown in figure 6, then they improved upon the same as per figure 7. Compare these with Prof. Arnold's, and comment is unnecessary."

Comment certainly is unnecessary, when to every one, who has looked at only a few samples of oleomargarine under the microscope, it is clear, that the only true representation of this article is that of this so-called "unknown amateur."

In the Baltimore *Sunday News*, of March 28, 1880, is an article on "Oleomargarine," by Prof. Vander Weyde, M. D., editor of the *Practical American*, and professor of chemistry in the U. S. Medical College, New York. After comparing butter and oleomargarine, in which comparison the latter is, of course, very superior to the former in every respect, the gentleman goes on to say:

"Let us now see what science teaches about it! Firstly, by the microscope we cannot detect any difference whatever, and we challenge any microscopist to distinguish in two samples which is which. In regard to a sensational illustration given by a certain John Michels (in which the appearance of oleomargarine under the microscope is given and largely published by the dealers in dairy butter, as contorted crystals or organisms, while that of dairy-butter is represented as consisting of perfectly round flat globules,) we have only to say, that we have prepared microscopic slides from fresh oleomargarine, and from old dairy-butter, and that the appearance is just the other way,—the oleomargarine presents the perfect round fat globules, while the dairy-butter shows the irregular shapes, and with some manipulation may show the same fanciful appearances as are figured by Michels as belonging to oleomargarine."

I wonder who furnished the samples and prepared them for the professor. As far as my experience goes I find this much abused Dr. Michels, (who is the unknown amateur,) perfectly correct in regard to the microscopic appearance of butter and oleomargarine. I found the margarine crystals in the very best of oleomargarine samples, and not a trace of them in the very oldest of dairy butter; and of this latter I have examined some very venerable boarding house samples, containing a great many things which are not very desirable in butter.

Prof. Vander Weyde says further: "The oleomargarine manufacturers have claimed before a government committee that their product is *pure and wholesome in itself*, and a fit substitute for butter. We think they ought to go a step farther and maintain that it is butter, and nothing else, only made *by an improved process*. In place of relying upon the cow to secrete its fat into the milk, and then depriving

the calf of its natural food by milking the cow and abstracting the fat from the milk by churning it, they now take the fat directly when the cattle are slaughtered, and instead of using all this fresh fat for soap-making, etc., for which much of it is too good, they change it into butter, which is perfectly identical with butter made from milk."

Oleomargarine made according to the original Mège process from pure caul fat, and as described in a recent number of the *Scientific American*, certainly does not contain anything injurious to health. It will also do very well where natural butter of a proper quality cannot be had; but to maintain that *it is butter*, made by an improvement upon the natural process, etc., is just as absurd as the assertion that an artificial leg was *is a real leg*, only an improvement upon the natural one, as it is not liable to rheumatism, gout, corns, etc. Oleomargarine may have some similar qualities superior to natural butter,—you find, for instance, no hairs in it—but it will never be natural butter.

The assertion that it is impossible to distinguish oleomargarine from genuine butter, is simply ridiculous. It is hard to conceive how Profs. Arnold and Vander Weyde, as professional microscopists, can make such statements. The only charitable explanation which occurs to me, is, that they examined samples sent to them by the oleomargarine manufacturers, which had previously been manipulated for this special purpose. Had they gathered their samples from the markets and groceries, just as the article is sold, the result certainly would have been quite a different one.

But it does not even take a microscope to distinguish between the articles in question. I showed a mixed lot of about twenty-five butter and oleomargarine samples to some ladies, practical housekeepers, to tell which was which. With two exceptions, where they were doubtful, their indications were correct. These two samples consisted of very inferior country butter, which they thought might be oleomargarine.

Some oleomargarine manufacturers recently invited a congressional committee to a banquet, at which about two hundred city farmers were present. The *New York Times* reports that, after drinking about six hundred bottles of wine, the company was unable to distinguish between butter and oleomargarine. Some of these city grangers may even have been unable to tell the sun from the moon after looking through so many bottles. Any half dozen practical, sen-

sible ladies would have been of infinitely greater value in deciding this matter.

The chief objection to oleomargarine lies in the fact, that in the process of manufacturing, the fat is never subjected to a greater heat than 124° F. Now it is a fact well-known to biologists that certain septic organisms will endure a much greater heat than this before they are killed and made harmless.

The Rev. Dallinger, of England, the first authority in this field, has, by a series of beautiful experiments, shown that germs of some putrefactive organisms require at least 212 to 235° F. for their destruction. Oleomargarine is a very assailable article in this respect, and may on this account become the cause of serious disease. My grocer, a very enthusiastic oleomargarine friend, by the way, tells me that during hot weather he cannot keep the article for this very reason.

Another very serious objection is the fact that the oleomargarine in our markets at present is to a very great extent adulterated, as already said. Pure oleomargarine, made according to the Mège process, does not contain anything objectionable or detrimental to health, although it is no butter. But some of these manufacturers, who are so unscrupulous as to mislead the public by erroneous and wilfully false statements, will also use in the manufacture of this artificial butter fat which is entirely unfit for human food. This is a fact clearly demonstrated by the microscope. I have seen crystals of urate of magnesia in different samples, a fact to which Dr. Taylor, the microscopist of the agricultural department in Washington has some time ago called attention. Other samples, judging from the peculiar stellate shaped crystals, apparently contain a great deal of lard..

The gentleman who had the first agency for oleomargarine in this city tells us that the article at first was of very good quality, but after some time it grew so bad that he gave it up in disgust. Adulteration of the most necessary articles of daily food has in our times become a most serious question. It has long engaged the best scientific and legislative talent of Europe. The necessity of some protection in this respect seems also at last to have dawned upon our American people. A pretty fable, circulating in the German papers some years ago, might be transferred to our soil without losing anything of its spicy truth: "Once upon a time four flies went abroad, and finally alighted in

a beautiful kitchen. The first one spied some cake dough, of which it partook. But the alum in the baking powder did not agree with the fly, and it pined away and died. The second fly, cautioned by the fate of its unfortunate companion, avoided cake dough, and refreshed itself from the sediments of a cup of coffee. But there was too much oxide of copper in it, and the fly's constitution was hopelessly shattered. The third, frightened by the sad termination of the career of its mates, concluded to shun sweet things, and keep itself to meats. So it ate heartily of a beautiful piece of red sausage; but this hashy article had been colored with arsenic, and the poor fly died even more quickly than its comrades. The fourth fly was a sly, knowing insect. It avoided everything, however tempting it looked, until it discovered a wet piece of paper in a shallow vessel, on which was printed 'fly poison.' This the fly selected as its pasture, and there continued to live and thrive in good health; for it was just as it suspected, the fly poison was also adulterated."

Having stated the objections against artificial butter I deem it but just to refute some erroneous statements of scientists which have been used by dairy men against oleomargarine. The first is, that according to the original process, the stomachs of pigs and sheep are finely chopped and mixed with oleomargarine on account of the pepsin which they contain, and that in this way trichinæ and the eggs of different kinds of tapeworm may be introduced into the human body. In regard to trichinæ the fear is entirely unfounded. Experiments which I have made on rats,—the results of which I have promised the Editor to publish at some future time in his journal—lead me to the conclusion that intestinal trichinæ given to healthy animals will never cause any symptom of trichinosis. It is only in the encysted state when eaten with raw or only half boiled ham that this worm becomes dangerous. A great many similar experiments in Germany and France corroborate this; and as the encysted trichinæ are never found in fat, but only in the muscles, there is no danger of their being introduced into the oleomargarine and eventually into the human body.

In the *German Grocer* I see a statement by Dr. Piper, of Chicago, that he has seen the eggs of tapeworms in oleomargarine. Any one who is acquainted with the natural history of these entozoa will be slow in receiving this as a fact. The tapeworms do not take their abode in the stomach, but

in the lower intestines. From here the fruitful portions, bearing an immense number of eggs, are separated from the head from time to time and carried off with the excrements. These eggs, which can endure any inclemency of climate, sometimes by accident in exposed localities will cling to plants, etc., and in this way be introduced again into the stomach of other animals or men, where they will develop into the intermediate stage of cysticerci. By eating lettuce, strawberries, etc., which have not been well washed, we run a much greater risk of becoming infested by these plaguey parasites, than by eating oleomargarine. The most dangerous of these entozoa is the *tænia echinococcus*, a very small worm, consisting only of three segments. It lives in its mature state in the dog. Countless millions of eggs are thrown out with the excrements of the infested animal. Some of these eggs are swallowed by other animals, in whose stomachs the embryos are quickly developed. Boring through the intestines they lodge in different portions of the body, where they develop into the so-called echinococci, whole colonies of which become enveloped in hydatid vesicles. The liver seems to be the favorite organ which is attacked by these echinococci. Vesicles as large as a small child's head are sometimes formed there.

On the island of Iceland this *tænia* causes 15 to 20 percent. of all the deaths which occur there among cattle and men. The so-called liver disease has become a terrible scourge on this island. The cause of this lies in the habit of these islanders living close together with their large packs of dogs. The dogs feeding on offal of slaughtered cattle infested with echinococci, or which have died from this disease become in their turn infested with the corresponding *tænia*. The echinococci develop in their intestines into the true tape-worm, and the cycle of transformation is finished and ready to commence anew. Now it is scarcely possible that eggs of this *tænia* will ever find their way into fat used for artificial butter. But such fat may contain the intermediate stage of the tape-worm, the echinococci, which would not be killed by 124° F., and introduced into the stomach of men will there develop into tape-worms. The long tape-worm which inhabits the intestines of men lives in its intermediate stage in the hog. And as lard, notwithstanding the solemn declarations of oleomargarine manufacturers, seems to be used in their factories, there may also be a possibility

of introducing this tape-worm into the human system; but I think the danger not very great. From this we see:

1. That oleomargarine, when made according to the original Mège process from pure, clear fat contains nothing injurious or objectionable. But it is no butter. In its microscopical appearance, as well as in its nutritive and dietetic qualities, it differs materially from natural butter.

2. The main objection to oleomargarine lies in the fact that the fat is not subjected to a heat sufficient to destroy the germs of septic and putrefactive organisms.

3. It is extensively adulterated. Lard and impure fats are used in its manufacture. If such fat comes from diseased animals it is all the more dangerous for the reason just stated.

4. There is no danger of trichinae or of eggs of tapeworms being introduced through oleomargarine into the human system. But there may be introduced the echinococci which develop into tapeworms.

A short notice of the more prevalent adulterations of butter may not be out of place here. To increase the weight it seems some dairymen mix their butter with soda, alum or potash. This may easily be detected by the taste.

A more harmless adulteration consists in mixing genuine butter with lard, wheat flour and boiled, finely crushed potatoes. Butter charged with flour and mashed potatoes will show the well defined starch granules under a power of about 400 diameters. Treated with iodine they will turn blue. At Dresden in Saxony, the health officers confiscated a large quantity of cheap butter which had been quite extensively sold there under the name of "water butter." An examination of this article showed, that only a small percentage consisted of genuine butter, while the bulk was nothing else but silica, chemically turned into jelly, flavored and colored. Good butter, under the microscope, will show nothing but oil-globules and the cubical crystals of salt.

When oleomargarine was first introduced here, it was generally passed off as genuine butter, under the name of northern or New York butter. But at present I do not think that there is a great deal of this article sold for natural butter, owing to the general agitation against oleomargarine, and then it is also difficult to deceive a practised eye. Of fifty samples of butter, which the editor and myself collected from the different portions of the city, only five were found to be oleomargarine. In collecting these samples it was always expressly stated that genuine butter was wanted.

Honest dealers, of course, will never deceive their customers, and always sell their articles for what they really are.

In these examinations I found polarized light extremely useful. Some foreign substances, especially crystalized impurities of fat are brought out beautifully under the polariscope—much more beautiful than healthful. The margarine crystals themselves form a beautiful object for the polariscope, while genuine butter will remain neutral, not showing any colors. The oil-globules in genuine butter in our illustration ought to be a little more regular in their shape, (being perfectly round), but that is, I suppose, the fault of my drawing. The sample from which the drawing was made was not a very rich one.



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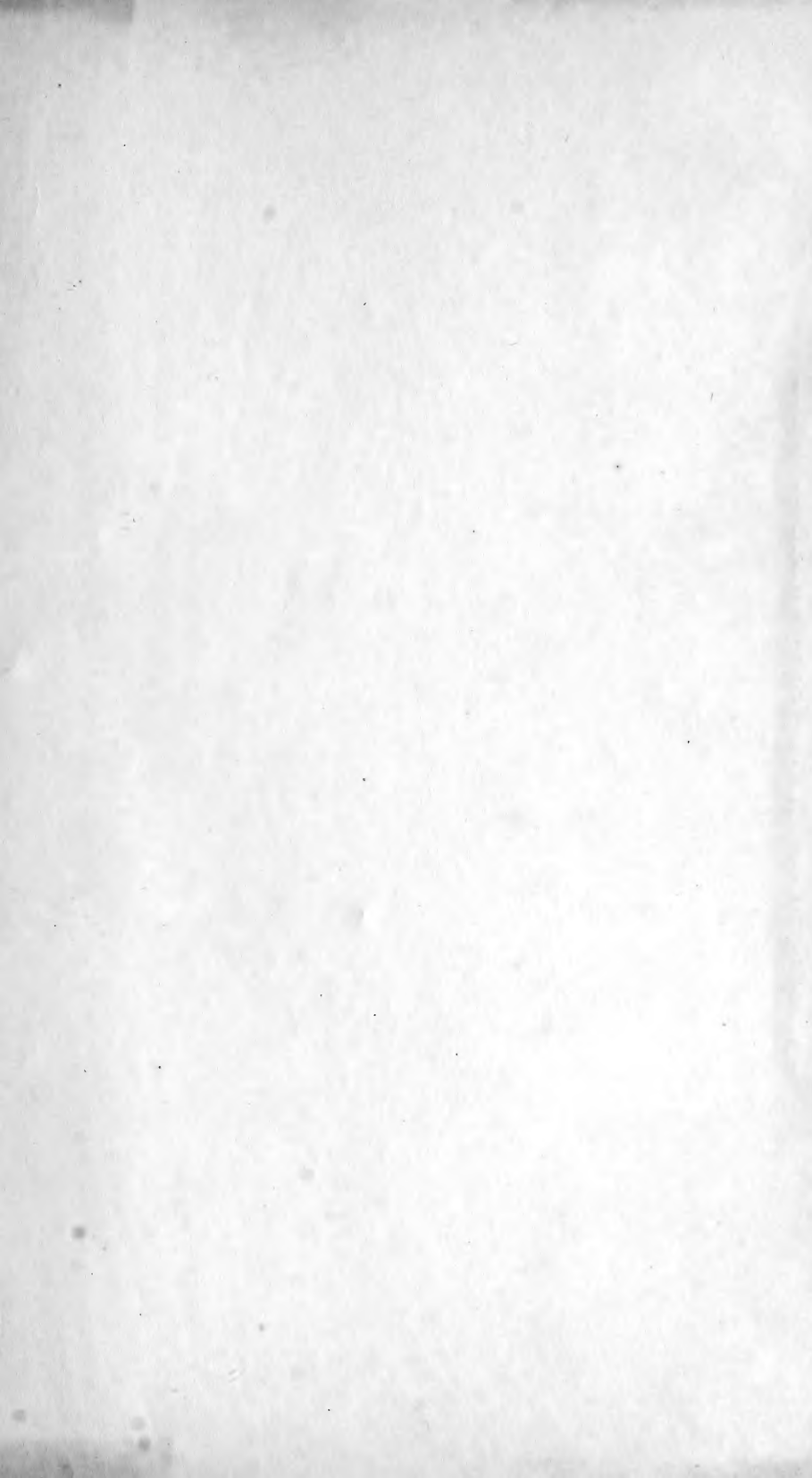
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